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Briefing Report to the Honorable
Dennis DeConcini, United States Senate

September 1987

WEAPON SYSTEMS

Effects of Army Decision to Reduce Helicopter Procurement



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The Honorable Dennis DeConcini
United States Senate

Dear Senator DeConcini:

In response to your March 23, 1987, request, we reviewed the Army's decision to curtail the procurement of attack, scout, and utility helicopters as reflected in the Department of Defense (DOD) fiscal year 1988 budget submitted to the Congress. We specifically reviewed the effect of the decision on the U.S. defense posture, including its possible impact on the U.S. helicopter production base. We also reviewed the Army's plans to compensate for acquiring fewer new aircraft.

In 1986, the Army decided to reduce procurement of its Apache attack helicopter and Army Helicopter Improvement Program (AHIP) scout with the result that deliveries of these aircraft will be completed 1 to 3 years earlier than planned. This funding reduction was one of several the Army made when it submitted its fiscal year 1988 procurement budget request. That request was significantly lower than it was estimated to be when the fiscal year 1987 budget request was prepared. In the fiscal year 1987 budget request, procurement fund needs for fiscal year 1988 were estimated at \$21 billion; in the fiscal year 1988 budget, \$16.2 billion was requested for procurement. In light of these lower funding levels, the Army decided to buy fewer helicopters and other weapon systems than planned, attempting to maintain some balance among its procurement programs. Other weapon systems whose quantities were cut in the Army fiscal year 1988 budget include the Abrams tank and the Bradley fighting vehicle. The production of the Black Hawk utility helicopter was not cut.

The decision to reduce helicopter production has two negative consequences. First, the Army will have to rely for a greater period of years on older and less capable helicopters, such as the Cobra attack helicopter and the OH-58 and OH-6 series of scout helicopters. Second, coupled with delays in fielding the next generation of attack, scout, and utility helicopters, which are in development under the

Light Helicopter Family (LHX) program, the decision will result in widening a gap between the production of the last of the Apaches, AHIPs, and Black Hawks and the initial production of the LHX. First deliveries of the LHX are not scheduled to begin until 1995.

With fewer Apaches and AHIPs to be produced, some Army units will operate with the older Cobra, OH-58A and OH-58C helicopters for longer periods than once anticipated. To the extent the older helicopters are less capable than the newer helicopters, those units will suffer some degradation in combat effectiveness. The Army, however, will minimize the impact in two ways--by continuing to deploy the newer aircraft with its higher priority combat units and by implementing previous plans to improve existing aircraft and extend their useful life.

The gap in the production of helicopters until the LHX is scheduled for production has widened to 6 to 9 years. According to the prime contractors involved, it would take several years to reopen the production lines for the Apache, AHIP, and Black Hawk should the need arise. The LHX program is in the early stages of development, where funding levels, requirements, equipment, and aircraft configuration are still being decided. Difficulties in settling these LHX issues as well as deciding on an acquisition strategy have prolonged the LHX's development.

The Army was aware of these consequences when it made the decision to reduce current helicopter production. According to Army leadership, a production gap until LHX production could begin was inevitable, because the Army could not afford additional production of the Apaches, AHIPs, and Black Hawks and to stretch their production out would increase unit costs. Army leadership noted that this decision involves risks, particularly regarding the prolonged use of older and less capable helicopters. However, the Army believes that the capabilities of the LHX, which in many respects would exceed those of the helicopters currently being produced, are worth waiting for. The Army sees the LHX as the centerpiece of Army aviation modernization and as the long-term response to the Soviet threat.

REDUCTIONS IN ARMY PROCUREMENT OBJECTIVES

Even before the cutbacks, procurement objectives for the Apache, AHIP, and Black Hawk helicopters fell short of Army requirements because of funding constraints. The Army's cuts in its planned buys increase the shortfall.

The Army's weapon system requirements are based on the need to equip a force structure of 28 divisions for its active, reserve, and National Guard units. Based on this force structure, the Army established requirements for 1,031 Apaches, 996 AHIPs, and 1,775 Black Hawks, not including what would be needed for the war reserve. The Army also established procurement objectives for each of these weapon systems, considering not only the Army's needs but also the systems' affordability. The result was that the procurement objectives were lower than the requirements. Procurement objectives can fluctuate from year to year as changes occur in available funding, weapon system costs, and weapon system priorities. The procurement objectives established prior to the reductions in fiscal year 1988 called for 675 Apaches, 578 AHIPs, and 1,111 Black Hawks.

The Army reduced its fiscal year 1988 aircraft procurement budget request by about 25 percent from its projection the previous year. As a result of this reduction and increased unit costs, the Army reduced the Apache attack helicopter procurement objective from 675 to 593. The AHIP procurement objective was reduced from 578 to 135 helicopters for use in the field artillery aerial observer role, one of its several planned roles. At the time of this reduction, the AHIP's capability to scout for both air cavalry and attack helicopter units had not been demonstrated in tests, and a firm decision to produce them for these roles had not been made. The Army did not change the Black Hawk procurement objective of 1,111.

EFFECT OF HELICOPTER PROCUREMENT
CUTBACKS ON DEFENSE POSTURE

With the cutbacks in helicopter production, the Army will rely to a greater degree than it had planned on older aircraft with less capabilities than the newer aircraft. The cutbacks will increase a break in the production of attack, scout, and utility helicopters. In relation to defense posture, a production break would become significant only to the extent that production would have to be resumed, for example, in the event of hostilities. Restarting production would involve a time lag and a cost increase. Should negotiations with the Soviet Union lead to adoption of the "zero option" agreement, and if the agreement created a need to procure more of these helicopters as part of an overall increase in conventional weapons, the procurement cutback could prove untimely. However, the specific response

to an agreement, including which additional weapons would have to be purchased by the Army, is not known at this time.

Reliance on older helicopters prolonged

As an example of the impact of the reduction, when the Army's Apache procurement objective was 675, the Army planned to equip 34 attack helicopter battalions with Apaches, 2 of which were National Guard units, and retain 30 battalions equipped with the older Cobra helicopters. With the cutback to the current procurement objective of 593 Apaches, the Army plans to equip 29 battalions with Apaches, 3 of which will be National Guard, and retain 35 battalions equipped with Cobras to fill the force structure requirement of 64 attack helicopter battalions.

As of April 1987, the Army had 7,668 attack, scout, and utility helicopters in inventory. Of these, 6,655 are older helicopters whose basic designs are over 20 years old. According to the Army, the older helicopters, such as the Cobra, would not be as effective in combat as the newer models because the newer models have been designed to perform their missions in a more intensive combat environment. Of the 6,655 older helicopters, 6,226 were produced in 1975 or earlier. Even though many of these have been upgraded over the years, they cannot match the survivability, flight performance, and firepower of the newer helicopters. For example, the Apache has greater speed and power than the Cobra and has night vision sensors which enable it to fly and find targets at night. The Apache is also equipped with the Hellfire missile, which is more lethal and accurate than the TOW missile carried by the Cobra.

Production base concerns

According to earlier production schedules, initial deliveries of LHX were to approximately coincide with the last deliveries of the Apache, Black Hawk, and AHIP. However, the reduction in the procurement of Apaches and AHIPs, coupled with the delays in fielding the LHX, has created a production gap of 6 to 9 years.

In the early stages of the LHX program, the Army planned to have completed its delivery of Apaches, Black Hawks, and AHIPs in 1990, 1991, and 1992, respectively, and to start deliveries of the LHX in 1991. With the recent reductions, final deliveries of both the Apache and the AHIP are due in 1989 while the first delivery of the LHX scout/attack helicopter has slipped to 1995, widening the production gap

to about 6 years. In addition, the first delivery of the LHX utility helicopter is now scheduled for the year 2000, leaving a gap of 9 years in utility helicopter production from the date the last Black Hawk is scheduled to be delivered. These production gaps assume no additional delays in the LHX program.

Three prime contractors are producing the newer attack, utility, and scout helicopters. McDonnell Douglas Helicopter Company produces the Apache; Sikorsky Aircraft Division, United Technologies Corporation, the Black Hawk; and Bell Helicopter Textron, the AHIP. A fourth major helicopter producer, Boeing Vertol, is not producing any of these helicopters but is competing for the LHX contract as a co-developer with Sikorsky Aircraft. The prime contractors producing Apaches, Black Hawks, and AHIPs estimate that after a major break in the production lines, it could take up to 3 years to begin deliveries and that production costs would rise if it were necessary to restart production. According to the contractors, the major effects of a lengthy halt in production would be the loss of skilled labor during the stoppage, the need to find and train new workers, and disruptions of suppliers' production and deliveries. Contractors also informed us that substantial portions of their work force would likely have to relocate to other areas to find new jobs.

For example, McDonnell Douglas officials told us that additional costs, including those of its suppliers, would total about \$1 billion¹ if production were halted for an extended period and then resumed. They estimated delivery of the first aircraft would take at least 36 months after the production line start-up. Currently it takes about 20 months to produce and deliver an Apache. We have not made an assessment of the reasonableness of the contractors' estimates to restart production.

Since the McDonnell Douglas facility at Mesa, Arizona, is primarily dedicated to the Apache, officials estimate that a production line shutdown would result in a 75-percent loss of its work force, some of whom might have to leave the area to

¹This cost increase is estimated on the basis of producing an additional 600 Apaches. The major element of the increase would be the additional labor hours resulting from a new labor force not having the experience and efficiency of the current labor force.

find work elsewhere. If the line were reopened, rehiring and training new personnel to fill the open positions would be time-consuming and costly. This effect would not only be felt at McDonnell Douglas but also at its suppliers. For example, General Electric Company, the engine contractor for the Apache and Black Hawk, which is the largest production-oriented employer in the Lynn, Massachusetts, area, predicted the loss of approximately 3,300 jobs were both lines to close.

Zero option

Your letter referred to the challenge of maintaining sufficient quantities of conventional weapons should "zero option" negotiations be successfully concluded with the Soviet Union. The negotiations have as a major objective the removal of certain nuclear weapons in Europe by both sides.

According to Army officials, if the "zero option" agreement becomes a reality, quantities of all conventional weapon systems in the North Atlantic Treaty Organization (NATO) forces would have to be increased to redress the imbalance created by the Warsaw Pact's already having a quantity advantage in conventional weapons in Europe. Thus, purchasing more helicopters would be only a part of an overall buildup of NATO conventional assets. The Army has not yet determined whether the agreement would necessitate increased production of its attack, scout, and utility helicopters.

ARMY ACTIONS THAT COULD COMPENSATE FOR PROCUREMENT OF FEWER HELICOPTERS

At this time, the Army has not taken actions to directly compensate for the reduced number of modern helicopters and the widening gap in production. Before the reductions were made, the Army had planned several improvements to the existing helicopter fleet that could lessen the effects of the production gap. The Army estimates it would incur \$10 billion in acquisition costs to continue production of the Apache and Black Hawk helicopters until LHX production begins. This does not include the additional operation and maintenance costs for these aircraft, which could be as high as the acquisition costs. The Army considered these costs and the risks of a production break in making its funding decision. The Army concluded that it would rather wait for the advanced capabilities offered by the LHX than purchase more Apaches, AHIPs, and Black Hawks.

Other options available to the Army to reduce the production gap would be stretching out the remaining production of the Apache, AHIP, and Black Hawk quantities, or purchasing enough additional helicopters to keep the lines open until the LHX is available. However, these actions would increase unit costs and place an additional demand on limited procurement funds.

The Army will have about 6,500 of the older attack, scout, and utility helicopters in its fleet in 1992 and about 2,000 left in the year 2006 when planned LHX deliveries are scheduled to end. Under the current procurement strategy, the Army plans to improve and use the older attack, scout, and utility helicopters in units having lower combat priorities and keep them longer.

In the next several years, the Soviets are expected to field two technologically advanced helicopters--the Havoc (which is similar to the Army's Apache) and the Hokum (which does not yet have a western counterpart). According to Army officials, the anticipated air-to-air threat created by the introduction of these helicopters will not result in changes to the Army's force structure or lead to an increase in the U.S. helicopter fleet inventory. Rather, the Army plans to respond to the air-to-air threat in the near term by improving the current fleet's capabilities, and in the long term with the fielding of the LHX.

The Army's immediate response to the threat will be to equip a portion of its attack, scout, and utility helicopter fleet with air-to-air Stinger missiles to give them a capability to defend themselves against enemy aircraft. All Apaches and AHIPs will be equipped with Stingers as will 179 Black Hawks, 597 OH-58s, and 515 Cobras. There are no plans to equip the Huey utility aircraft with Stingers. Other improvements are being considered, such as equipping the Apache with a new canopy, rear view mirrors, and television cameras to enable the pilot to see enemy aircraft approaching from behind.

The long-term response to the Soviet threat will be the addition of the LHX fleet scheduled to begin fielding in the mid-1990s. The LHX is to replace the Cobra attack helicopter, the Huey utility helicopter, and most of the OH-58 and OH-6 series of scout helicopters. The LHX is being designed to operate across the forward line of troops, to utilize improved sensors for finding targets, and to have the ability to attack enemy helicopters.

The Army also has several efforts underway which will improve the performance and reliability of its older helicopters. One of the more significant efforts is adding the night vision capability to the Cobra's targeting system. The Army is still to determine how to make up for the reduction in AHIPs and is evaluating the results of a test of several helicopters currently in inventory to perform the AHIP role. This evaluation could result in additional modifications to one of the existing helicopter models.

A more detailed comparison of the attack, scout, and utility helicopters in the current inventory, and a description of improvements the Army is considering for each system, are in appendix I.

CONCLUSIONS

The Army has attempted to cushion the impact of reductions in procurement funds by spreading the reductions among various weapon system programs. The effect of the cuts on its helicopter fighting capability may be particularly hard felt because of the age of most existing helicopters. Even with additional modifications, these older helicopters, such as the Cobra, will remain less capable than the more modern aircraft like the Apaches. The cuts will also lengthen the period of time during which there will be no production of attack, scout, or utility helicopters. The Army recognizes these consequences of its funding decision but is willing to accept the risks until the LHX becomes available.

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In conducting our review, we examined pertinent documents and held discussions with officials at Army headquarters, at the Army Aviation Systems Command, and at the Army Aviation Center. In addition, we held discussions with contractor officials who produce the attack, scout, and utility helicopters. We conducted our audit work from April through August 1987. Our review was performed in accordance with generally accepted government audit standards.

We discussed the results of our work with Army officials and included their comments where appropriate. At your request, we did not obtain official agency comments.

As arranged with your Office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 5 days from the date of the report. At that time, we will send copies to interested parties, including

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the Chairmen, House and Senate Committees on Armed Services and on Appropriations, the Secretaries of Defense and the Army, and others upon request.

Sincerely yours,

for 
Frank C. Conahan
Assistant Comptroller General

INVENTORIES AND CAPABILITIES
OF ATTACK, SCOUT, AND UTILITY HELICOPTERS

As of April 1987, the Army inventory included 6,655 older models of attack, scout, and utility helicopters, which the Army plans to replace with new models. Table I.1 identifies the older models and the newer models replacing them:

Table I.1: Current and Future Army Attack, Scout, and Utility Helicopters

<u>Basic mission</u>	<u>Older models</u>	<u>Newer models</u>	
		<u>In production</u>	<u>In development</u>
Attack	AH-1 (Cobra) UH-1M (Huey-gunship)	AH-64 (Apache)	LHX Scout/Attack
Scout	OH-58A (Kiowa) OH-58C (Kiowa) OH-6A (Cayuse)	OH-58D (AHIP)	LHX Scout/Attack
Utility	UH-1H,V (Huey)	UH-60 (Black Hawk)	LHX Utility

The earliest models were first produced in the early 1960s and, except for the Cobras and a small number of Hueys, have not been produced since 1975. Of the 6,655 older helicopters, 6,225 were manufactured in 1975 or earlier. The UH-1M is a utility helicopter which was converted to an attack helicopter during the Vietnam era and has since been replaced by the Cobra.

Table I.2 reflects the April 1987 inventory of older helicopters and the years they were produced.

Table I.2: Inventory and Age of Older Helicopters

Helicopter	Total	Manufacturing years				
		1962-70	1971-75	1976-80	1981-85	1986-87
Attack						
AH-1	1,014	434	205	268	65	42
UH-1M	211	211	-	-	-	-
Total	<u>1,225</u>	<u>645</u>	<u>205</u>	<u>268</u>	<u>65</u>	<u>42</u>
Scout						
OH-6A	364	318	46	-	-	-
OH-58A,C	1,820	500	1,320	-	-	-
Total	<u>2,184</u>	<u>818</u>	<u>1,366</u>	-	-	-
Utility						
UH-1H,V	3,246	2,179	1,013	54	-	-
Total	<u>6,655</u>	<u>3,642</u>	<u>2,584</u>	<u>322</u>	<u>65</u>	<u>42</u>

In addition to the older models in the inventory, the Army has already received some of the newer models. Table I.3 contains current procurement objectives and final delivery dates for these models.

Table I.3: Procurement Objectives, Inventory, and Scheduled Final Deliveries of New Helicopters

Helicopter	Procurement objective	April 1987 inventory	Final delivery
Apache	593	202	1989
AHIP	135	50	1989
Black Hawk	1,111	761	1991

COMPARATIVE PERFORMANCE CAPABILITIES

Each of the helicopters currently being produced has one or more specified missions. The older models are generally capable of performing the same basic missions as the newer ones but not as well. Also, they are less capable of surviving against threat weaponry.

Comparison of Apache and Cobra
attack helicopters

The attack helicopters' primary mission is to attack ground forces. The Apache exceeds its requirements for a vertical rate of climb¹ greater than 450 feet per minute (fpm) while carrying a minimum of 8 Hellfire missiles and 320 rounds of 30 millimeter ammunition. It also exceeds its requirements to endure a 1.8 hour mission and operate at 4,000 feet in 95-degree Fahrenheit temperature. The most capable version of the Cobra attack helicopter cannot meet these requirements. Table I.4 compares the abilities of these two helicopters to perform a Mid-East, anti-tank mission which requires operations in high temperatures and altitude:

Table I.4: Comparison of Apache and Cobra Capabilities

	<u>Apache</u>	<u>Cobra</u>
Vertical rate of climb (fpm)	450	None ^a
Endurance (hours)	1.9	1.4
Anti-tank missiles carried	16 Hellfire	8 TOW
Cannon ammunition (rounds)	320 (30 mm)	500 (20 mm)

^aUnder these conditions, the Cobra would technically have no vertical rate of climb. It could lift off the ground and hover as long as it was still within the cushioning effect of the ground. However, it could not climb straight up from that point; it would have to accelerate forward and use momentum to climb.

Army officials noted that beyond the numbers presented here, comparisons should consider the Apache's many advantages over the Cobra, including night vision capability; greater range and precision of targeting and fire control systems; the greater range, lethality and precision of the Hellfire missile; the wider range of its survivability enhancements, such as its lower infrared signature, greater ballistic tolerances, redundant engines and other systems; and the array of radar warning and jamming devices.

¹Vertical rate of climb measures how fast a helicopter can climb straight up once it is beyond the cushioning effect of the accelerated air from the rotor blades reflecting off and compressing against the ground.

Comparison of the AHIP with
older scout helicopters

The primary mission of the scout helicopter is to perform aerial reconnaissance and to communicate target information to attacking units. The Army had planned to replace the OH-58 and OH-6 scout helicopters with the AHIP in air cavalry, attack helicopter, and field artillery units. In August 1986 it decided to limit procurement to 135 AHIPs for use in the artillery role. The AHIP's speed, endurance, and vertical rate of climb are relatively equal to that of the OH-58C, the most upgraded of the scout models being replaced. However, the AHIP has night targeting and limited adverse weather capabilities and provides greater flight stability at the low altitudes required in combat. It has television equipment, thermal sensors, and laser ranging and designating equipment not found on the older models. Its mast-mounted sight, a feature not available in other scout aircraft, allows greater concealment from enemy visual and sensor devices. The AHIP also has automated navigational aids that provide more precise coordinates for locating targets for conventional and precision-guided munitions.

Comparison of Black Hawk and
Huey utility helicopters

The primary mission of the utility helicopter is to transport troops and their equipment during air assault and resupply operations. Table I.5 lists some of the performance capabilities of the Black Hawk compared to those of the Huey (the aircraft it is replacing).

Table I.5: Comparison of Black Hawk and Huey Capabilities

	<u>Black Hawk</u>	<u>Huey</u>
Useful load (pounds)	6,195	4,368
Normal cruise speed (knots)	145	90-120
Troop seats	14	11
Maximum external load capacity (pounds)	8,000	4,000

In addition to these comparisons, the Black Hawk provides better performance on a hot day and incorporates better survivability features. It has greater ballistic tolerance, improved warning devices, lower acoustic signature, twin engines, and other

redundancies, as well as better communications and navigational equipment.

CURRENT PROPOSED IMPROVEMENTS

The Army plans to improve its existing attack, scout, and utility helicopters. The following are the more significant improvement efforts underway or being considered for each system:

Apache

Four product improvement programs are currently planned. They involve installing a device to cut wires during flight, automatic target handover systems, blue/green cockpit lighting, and flight data recorders. The air-to-air Stinger missile will be added to all Apaches beginning in 1990. Other improvements being considered include improving the accuracy of its 30 mm chain gun, improving the crew's field of view through a new canopy design, installing mirrors and television cameras to permit a rear view, improving avionics architecture, and providing advanced flight controls.

Cobra

The Army has two major programs for extending the useful life of the aircraft and improving its mission performance. The C-Flex program will improve main rotor hub and control linkage, improve TOW missile system reliability, and upgrade the radio equipment. The C-Nite program will provide the Cobra with a thermal imaging sight for night target acquisition and engagement. The Army plans to equip about 515 of its Cobras with the air-to-air Stinger missile system. The Cobra is expected to be in active use until 2010.

AHIP

No product improvement program has been approved for the AHIP. However, proposals have been made to add equipment, such as a video recorder, a data loader, a radio frequency interferometer, and global positioning systems. The Army plans to equip all AHIPs with the air-to-air Stinger missile system starting about 1991. The expected remaining life of the system is at least 20 years.

OH-58A, OH-58C, and OH-6

The Army plans to replace the T63-A-700 engine (a 317 shaft horsepower engine installed in all OH-58A and OH-6A helicopters) with the T63-A720 engine (a 420 shaft horsepower engine). This would provide better high-altitude and hot-day performance. This

change will not upgrade the OH-58A models to the "C" configuration since there are better avionics in the "C" models. The Army is also considering adding integrated controls and instrumentation in the cockpits. Stinger missile systems are planned for installation on 597 of the current OH-58 fleet beginning about 1988.

Black Hawk

The Army is considering numerous improvements to the Black Hawk. These improvements include an improved durability gear box, global positioning systems, an integrated cockpit, an improved visibility cockpit, and a flight data recorder. In addition, the Army plans to equip 179 Black Hawks with the Stinger missile system.

Huey

The Army's project manager for Huey helicopters stated that major improvements to the Huey fleet are not planned. Some product improvement efforts that address reliability, maintainability, and safety of flight issues are ongoing or planned. There are no plans to equip Hueys with air-to-air Stinger missiles. The UH-1M currently used in the attack helicopter role is planned to be phased out by the early 1990s and all others by the year 2004.

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